

Electro-Voice®

o MARK IV company



FIGURE 1
MTH-4A Axial Frequency Response
Using MTX-4 Electronics Unit
(1 watt/1 meter into MB section)

MTH-4A

Manifold Technology®

MidBass/Midrange/ High-Frequency Sound Reinforcement System

SPECIFICATIONS

Frequency Response, Measured in Farfield
Calculated to One Meter on Axis, Swept
One-Third-Octave Pink Noise, One Watt
into MB Section, Anechoic Environment
(see Figure 1):

150-20,000 Hz

Recommended Crossover Frequencies:

160 Hz, 1,600 Hz, 10,000 Hz

Efficiency, MB/MF/HF:

25/25/25%

Long-Term Average Power Handling

Capacity per EIA Standard RS-426A (see
Power Handling section),

MB/MF/HF: 1,200/240/100 watts

Short-Term Power Handling Capacity
(10 milliseconds),

MB/MF/HF: 4,800/960/400 watts

Maximum Long-Term Average Midband

Acoustic Output:

360 watts

Sound Pressure Level at One Meter,

Indicated Input Power, Anechoic Environ-

ment, Band-Limited Pink-Noise Signal,

MB/MF/HF,

1/1/1 Watt: 109/113/108 dB

1,200/240/100 Watts: 140/137/128 dB

4,800/960/400 Watts: 146/143/134 dB

Dispersion Angle Included by 6-dB-Down

Points on Polar Responses, Indicated

One-Third-Octave Bands of Pink Noise,

600-20,000 Hz Horizontal (see Figure 4):

60° (+10°, -8°)

600-20,000 Hz Vertical (see Figure 4):

40° (+15°, -5°)

Directivity Factor R_e (Q), 600-20,000-Hz

Median (see Figure 5):

23.3 (+6.3, -8.0)

Directivity Index D_i , 600-20,000-Hz Median

(see Figure 5):

13.6 dB (+1.1 dB, -1.7 dB)

Distortion, 130 dB SPL at 1 Meter,

Shaped Spectrum (see Figure 6),

Second Harmonic,

200 Hz: 1.1%

1,000 Hz: 1.0%

3,000 Hz: 4.0%

10,000 Hz: 2.7%

Distortion, 130 dB SPL at 1 Meter,

Shaped Spectrum (see Figure 6),

Third Harmonic,

200 Hz: 0.5%

1,000 Hz: 3.0%

3,000 Hz: 0.9%

10,000 Hz: 3.1%

Transducer Complement,

MB: Four DL10X 10-inch drivers

integrated 60° x 40° horn

MF: Four DH2Amt compression

drivers

HP64 60° x 40° horn

HF: Four DH2010 compression drivers

HP64 60° x 40° horn

impedance (MB wired in paralleled pairs;

MF/HF wired in single parallel-series

combinations, see Figure 8),

Nominal, MB/MF/HF:

8-ohms (pair)/8 ohms/8 ohms

Minimum, MB/MF/HF:

5.6-ohms (pair)/7.8 ohms/8.0 ohms

Input Connections:

Neutrik Speakon™ NLBMPR

Enclosure Materials,

Structural, All Versions:

14-ply birch plywood

Finish,

MTH-4AC, MTH-4ACF:

Black Ozite Super TNT carpet

MTH-4AP, MTH-4APF:

Black textured paint

Hanging (MTH-4ACF and MTH-4APF only):

Two-point flying system

(tracks accept Kinedyne 32102-1 and

32111-1 fittings)

Dimensions,

Height: 91.4 cm (36.0 in.)

Width: 91.4 cm (36.0 in.)

Depth: 76.2 cm (29.9 in.)

Net Weight:

167 kg (370 lb)

Shipping Weight:

189 kg (418 lb)

DESCRIPTION

The Electro-Voice MTH-4A Manifold Technology® midbass/midrange/high-frequency system was designed for high-level concert sound reinforcement in touring sound and permanent installation applications. The MTH-4A is a three-way, active, horn-loaded system utilizing four drivers in each frequency band for a total of twelve drivers in a remarkably small enclosure. The combination of the MTH-4A midbass/midrange/high-frequency loudspeaker system and the MTL-4A low-frequency loudspeaker system form the four-way active MT-4A concert sound loudspeaker system. Optimum performance of the MT-4A is obtained when used with the dedicated MTX-4A electronic crossover/equalizer/time delay unit. There are four models in the MTH-4A series: the MTH-4AC (carpeted finish), the MTH-4ACF (carpeted finish with flying hardware), the MTH-4AP (painted finish) and the MTH-4APF (painted finish with flying hardware).

The midbass section operates over the range of 150-2,000 Hz and utilizes four DL10X 10-inch drivers. The extended upper-end response is achieved by using a proprietary phase plug (U.S. Patent No. 4,718,517). An aperiodic enhancer, this phase plug makes use of the fact that at higher frequencies, only the apex area of the cone near the voice coil is in motion and automatically adjusts acoustic loading to maximize high-frequency output. The output of the four drivers is summed through a unique midbass manifold (U.S. Patent No. 4,923,021) and fed into an integral 60° x 40° constant-directivity horn. The result is uniform coverage and an exceptionally

natural sound throughout the entire vocal range.

The midrange section contains four DH2Amt compression drivers manifolded onto a single HP64 60° x 40° constant-directivity horn. The drivers come in a modified package that facilitates manifolding, but maintain the same high performance and reliability of the standard DH2A drivers by utilizing the same titanium diaphragm and motor assembly. The outputs of the four drivers are combined by the MTA-42 manifold device (U.S. Patent No. 4,629,029) that achieves total summation of acoustic power up to 20,000 Hz without phase cancellations. The output of the manifold is fed into a small flat-front constant-directivity horn, the HP64, geometrically optimized for performance from 1,500 Hz to 20,000 Hz. The HP64 design is based on the EV HP horn series (U.S. Patent No. 4,685,532) that features integral fiberglass-and-zinc construction for exceptional strength. The HP series also features beamwidth control vanes special waveguides in the horn throat that correct the very-high-frequency dispersion anomalies of other 2-inch-throat horns.

The high-frequency section employs four DH2010 compression drivers that feature a titanium diaphragm and a unique convex-drive Time Path™ phasing plug structure (U.S. Patent No. 4,525,604) for smooth end extended high-frequency performance to 20,000 Hz. The tweeter drivers are mounted on the MTA-42 high-frequency manifold and HP64 60° x 40° constant-directivity horn identical to that used for the midrange. The use of identical horns end manifolds results in equal acoustic path lengths for the two sections.

Designed to survive the rigors of the road, all versions of the MTH-4A are constructed of 14-ply birch plywood. The MTH-4AC and MTH-4ACF (flying option) are covered with black Ozite Super TNT carpeting, the most rugged in the industry. For permanent installations, the MTH-4AP and MTH-4APF (flying option) are available, finished with black textured paint. All versions feature a black nylon cloth grille. The MTH-4ACF flying option incorporates a unique two-point flying system (see hanging section). The RD-1 removable dolly is available as an option for the carpeted version.

APPLICATIONS

The MTH-4A is ideal for any professional touring or installation application requiring mid-bass, midrange and high-frequency reproduction at high sound pressure levels with low distortion. Manifold Technology maximizes the acoustic output per bulk volume and frontal area of the enclosure, enabling more compact systems and arrays than would be obtainable with conventional sound reinforcement enclosure designs. Additionally, because of its square-front design, the MTH-4A may be stacked or hung so that the 60° x 40° coverage pattern is oriented horizontally or vertically.

The dimensions of the MTH-4A were chosen for efficient truck pack and high-density array design. The cabinets may be stacked three high and three wide in a standard tractor trailer allowing for nearly 14,000 watts of sound system to be accommodated in only three feet of truck floor length. Careful attention was paid to details to provide both the touring company and the sound contractor with a convenient and time-saving professional sound reinforcement

package.

For full-range applications the MTH-4A may be combined with the MTL-4A low-frequency sound reinforcement system. Designed as an integrated package, both systems have identical external dimensions and matching hardware. For optimum acoustic performance, the MTX-4A four-way electronic crossover/equalizer/time delay unit should be used with the full-range MT-4A system.

FREQUENCY RESPONSE

The MTH-4A frequency response, shown in Figure 1, was measured on axis in the farfield in an anechoic environment using a swept one-third-octave input and calculated to a one meter equivalent distance by using the inverse-square law. The MTH-4A system was set up using the MTX-4A electronic crossover/equalizer/time delay unit with crossover frequencies at 1,600 and 10,000 Hz and no crossover on the bottom of the midbass section. One watt of power (2.00 V) was delivered to the midbass section. The frequency response of the complete MT-4A system (the MTH-4A and the MTL-4A together) using the MTX-4A with one watt (2.00 V) being delivered to the midbass section of the MTH-4A is shown in Figure 2.

DIRECTIVITY

The polar response of the MTH-4A speaker system at selected 1/3-octave bandwidths is shown in Figure 3. These polar responses were measured in an anechoic environment at 20 feet using a pink noise input and the MTX-4A electronics unit (see Crossover, EQ and Time Delay section). The frequencies selected are fully representative of the polar response of the system. Beamwidth of the system utilizing the complete 1/3-octave polar data is shown in Figure 4. R_p (Q) and directivity index (D) are plotted in Figure 5. AcoustiCADD™ data is available for the MTH-4A.

DISTORTION

Using the MTX-4A electronics unit (see Crossover, EQ and Time Delay section), distortion for the MTH-4A speaker system was measured in the farfield with an input power that would result in a sound pressure level of 130 dB at one meter. A frequency spectrum typical of contemporary close-miked rock music was employed. Plots of second- and third-order harmonic distortion are shown in Figure 6.

POWER HANDLING CAPACITY

To our knowledge, Electro-Voice was the first U.S. manufacturer to develop and publish a power test closely related to real-life conditions. First, we use a random noise input signal because it contains many frequencies simultaneously, just like real voice or instrument program. Second, our signal contains more energy at extremely high and low frequencies than typical actual program, adding an extra measure of reliability. Third, the test signal includes not only the overall "long-term average" or "continuous" level — which our ears interpret as loudness — but also short-duration peaks which are many times higher than the average, just like actual program. The long-term average level stresses the speaker thermally (heat). The instantaneous peaks test mechanical reliability (cone and diaphragm excursion). Note that the sine-wave test signals sometimes used have a much less demanding peak value relative to their average

level. In actual use, long-term average levels exist from several seconds on up, but we apply the long-term average for several hours, adding another extreme measure of reliability.

Specifically, the MTH-4A is designed to withstand the power test described in EIA Standard RS-426A. The EIA test spectrum is applied for eight hours. To obtain the spectrum, the output of a white noise generator (white noise is a particular type of random noise with equal energy per bandwidth in Hz) is fed to a shaping filter with 6-dB-per-octave slopes below 40 Hz and above 318 Hz. When measured with the usual constant-percentage analyzer (one-third-octave), this shaping filter produces a spectrum whose 3-dB-down points are at 100 Hz and 1,200 Hz with a 3-dB-per-octave slope above 1,200 Hz. This shaped signal is then divided into the three frequency bands of operation using the recommended crossover, equalization and time delay (see Crossover, EQ and Time Delay section). The midbass amplifier is set with continuous power at 600 watts into each of the 3.45-ohm EIA-equivalent-impedance inputs (45.5 volts true RMS), resulting in a total of 1,200 watts being delivered to the midbass section. Amplifier clipping sets instantaneous peaks at 6 dB above the continuous power, or 4,800 watts peak (91.0 volts per input). The midrange amplifier is set with continuous power at 240 watts into the 5.18-ohm EIA-equivalent-impedance input (35.3 volts true RMS), with amplifier clipping setting instantaneous peaks at 960 watts (70.6 volts true RMS). The high-frequency amplifier is set with continuous power at 100 watts into the 5.75-ohm EIA-equivalent-impedance input (24.0 volts true RMS), with amplifier clipping setting instantaneous peaks at 400 watts (48.0 volts true RMS). This procedure provides a rigorous test of both thermal and mechanical failure modes.

CROSSOVER, EQ AND TIME DELAY

The usable frequency ranges of the individual sections of the MTH-4A are 150-2,000 Hz for the midbass, 1,200-16,000 Hz for the midrange and 6,000-20,000 Hz for the high-frequency band. Minimum crossover slopes of 12-dB-per-octave are recommended. Low-frequency protection capacitors are included in the midrange and high-frequency sections, with respective 3-dB-down points of 800 Hz and 4,000 Hz.

The usable frequency response of the overall MTH-4A midbass/midrange/high-frequency loudspeaker system is 150-20,000 Hz. For maximum performance of the MTH-4A in a full-range application, the addition of the Electro-Voice MTL-4A low-frequency loudspeaker system is recommended. This combination forms the MT-4A full-range high-level sound-reinforcement system. For maximum acoustic performance, use the Electro-Voice MTX-4A electronic crossover/equalizer/time delay unit.

The MTX-4A is an electronics unit dedicated for use with the MT-4A loudspeaker system. The MTX-4A is a four-way electronic crossover with fixed crossover frequencies of 160, 1,600 and 10,000 Hz that utilizes Linkwitz-Riley 24-dB-per-octave filters and fixed time delay in each band to achieve time alignment and zero lobing error.

In addition, there is equalization on the high-frequency outputs to compensate for the compression driver power response rolloff and a 32-Hz high-pass filter to protect the woofers from infrasonic frequencies. The result is an anechoic frequency response with 3-dB down

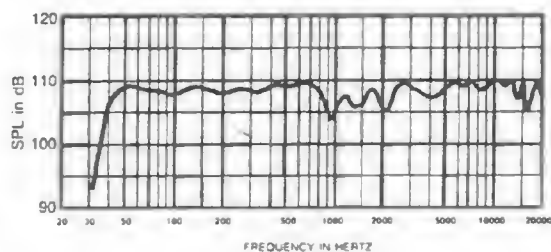


FIGURE 2
MT-4A System Axial Frequency
Response Using MTX-4A Electronics
Unit (1 watt/1 meter into MB section)

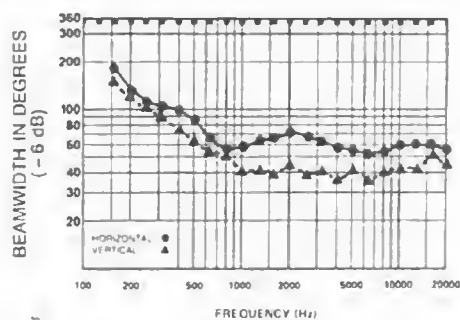


FIGURE 4
MTH-4A Beamwidth vs. Frequency

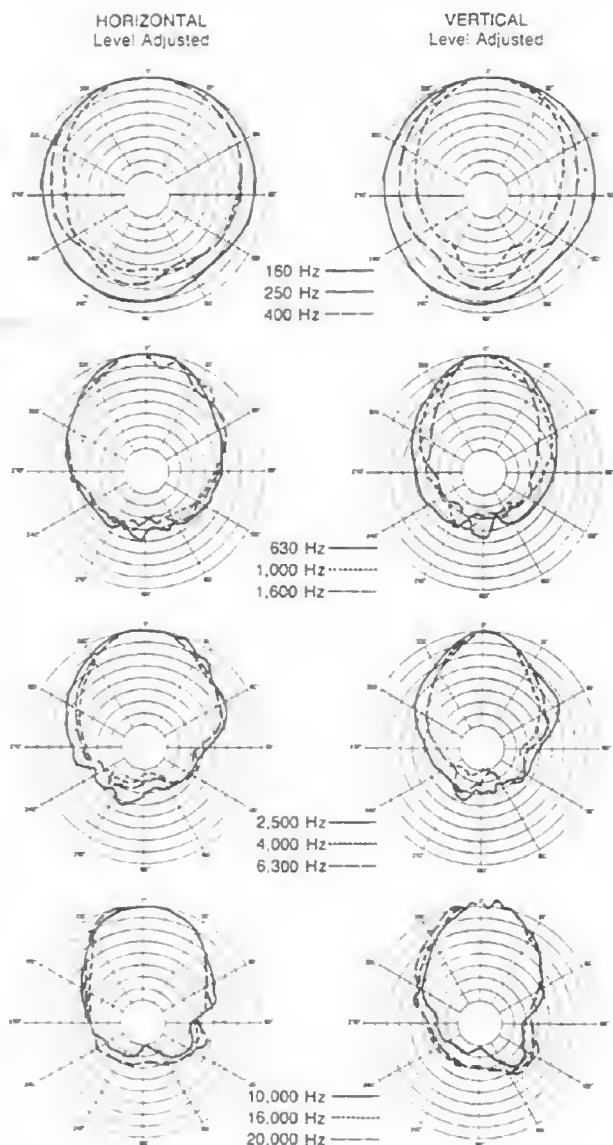


FIGURE 3
MTH-4A Polar Response
($\frac{1}{3}$ -octave, 4 volts at 20 feet)

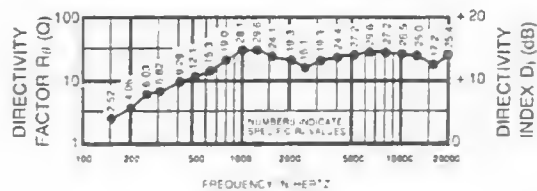


FIGURE 5
MTH-4A Directivity Factor and
Directivity Index vs. Frequency

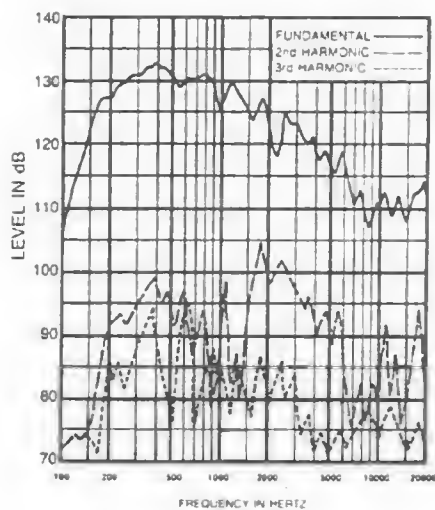


FIGURE 6
MTH-4A Harmonic Distortion
(130 dB SPL/1 meter using typical
music frequency spectrum)

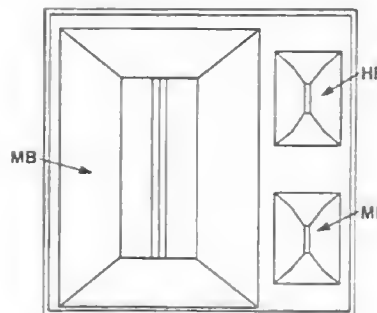


FIGURE 7 — MTH-4A
Cabinet Layout

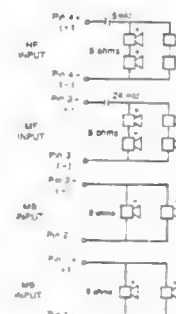


FIGURE 8
MTH-4A Wiring
Configuration

points at 37 Hz and 20,000 Hz (see Figure 2). The gain structure of the MTX-4A is setup so that, with the output level controls set in their zero-detent position, the MT-4A speaker system will have a flat frequency response (as shown in Figure 2) when amplifiers having identical gain are used.

CONNECTION

Electrical connections are made on the back of the MTH-4A enclosure via an 8-pin connector. The midbass section has four 8-ohm loudspeakers; however the acoustic loading of the midbass phase plugs and horn increases their electrical impedance to 16 ohms each. These four loudspeakers are wired in paralleled pairs resulting in two 8-ohm loads accessed by four pins of the connector. The midrange section has four 8-ohm drivers wired in a parallel-series arrangement resulting in one 8-ohm load accessed by two additional pins. The high-frequency section also has four 8-ohm drivers wired in parallel series with a resulting 8-ohm load accessed by the two remaining pins of the connector. There are two connectors on the enclosure; to allow paralleling of other MTH-4A systems. The Neutrik Speakon NL8MPR panel-mount connector is used for both connections. The pin-out arrangement and wiring diagram is shown in Figure 7. One mating Neutrik Speakon NL8FC cable-end connector is supplied with each system.

Neutrik Speakon cables, connectors and wiring accessories are available from Pro Co Sound, Inc., and Whirlwind Music Distributors, Inc. To find your local Pro Co or Whirlwind, or Neutrik dealer, contact:

Pro Co Sound, Inc.
135 E. Kalamazoo Ave.
Kalamazoo, MI 49007

Whirlwind Music Distributors, Inc.
P.O. Box 1075
Rochester, NY 14603

Neutrik USA, Inc.
195-S3 Lehigh Ave.
Lakewood, NJ 08701

HANGING

The MTH-4ACF (carpeted) and MTH-4APF (painted) are flying-option versions. In addition to a time savings in setup, their unique two-point flying system permits a wide range of angle adjustment and offers maximum flexibility in array design and implementation for both the sound touring company and the sound contractor.

Each enclosure side (not the top and bottom) has two tracks, placed to facilitate proper suspension and arraying. The tracks are placed to permit arraying the MTH-4A with the 60° coverage angle either horizontal or vertical. The surface of the tracks lies below the enclosure surface, to avoid any box-to-box interference problems during system transportation. The tracks mate with Kinedyne 32102-1 and 32111-1 double-stud ring fittings. Electro-Voice offers a complete line of flying accessories for use with the MT-4A speaker system.

CAUTION: The MTH-4A speaker systems should be suspended overhead only in accordance with the procedures and limitations specified in the Flying Manual included with the flying loudspeakers.

FIELD SERVICE

The MTH-4A was designed for expedient field service. To access the midrange and high-frequency drivers, first remove the nylon grille.

The grille may be removed by simply grabbing the tabs and gently pulling it off. Next, with the cabinet on its back, remove the eight 1/4-20 flat-head hex-socket-drive bolts that secure the removable horn/driver baffle board using a 5/32-inch Allen wrench. The baffle board may then be lifted straight out of the enclosure allowing access to the drivers. To access the 10-inch midbass drivers, turn the cabinet face down and remove the screws that secure the removable back using a #2 Phillips screwdriver and lift the back off. Next, remove the four 1/4-20 hex-head bolts which secure each woofer with a 3/8-inch socket. The drivers can then be lifted away from the baffle board and slid out around the phase plugs.

A woofer failure will require replacement of the entire driver. In the case of a compression driver failure, a diaphragm assembly replacement kit with instructions may be ordered from Electro-Voice; or, if desired, the complete driver may be returned for service. The following replacement parts are available from the Electro-Voice service department in Buchanan, Michigan:

HF: Diaphragm kit; EV Part No. 81397XX
MF: Diaphragm kit; EV Part No. 81161XX
MB: Complete driver; 810-1490

Complete service information can be found in the Service Data Sheet available from the Service Department in Buchanan, Michigan.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The loudspeaker system shall be a three-way active midbass/midrange/high-frequency system with four drivers manifolded in each frequency band for a total of 12 drivers. The mid-bass section shall have four 10-inch drivers, each having an 8-ohm, 2.5-inch-diameter voice coil constructed of edge-wound rectangular aluminum wire, and shall be capable of handling a 300-watt shaped pink-noise signal with 6-dB crest factor for 8 hours (as per EIA RS-426A standard). These four drivers shall each be loaded with a phase plug and manifolded onto a single 60° x 40° constant-directivity-type horn. The midrange section shall have four 1.0-inch-exit compression drivers, each having an 8-ohm, 2.0-inch-diameter voice coil constructed of edge-wound rectangular aluminum wire mounted on a 0.0010-inch-thick titanium diaphragm, and shall be capable of handling a 60-watt 1,500-15,000-Hz pink-noise signal with a 6-dB crest factor for 2 hours (as per AES2-1984 and ANSI S4.26-1984 standards). These four drivers shall be manifolded onto a single 60° x 40° constant-directivity-type horn. The high-frequency section shall have four 1.0-inch-exit compression drivers, each having an 8-ohm, 1.25-inch-diameter voice coil constructed of aluminum mounted on a 0.0010-inch-thick titanium diaphragm, and shall be capable of handling a 25-watt, 5,000-20,000 Hz pink-noise signal with a 6-dB crest factor for 2 hours (as per AES-1984 and ANSI S4.26-1984 standards). These four drivers shall be mounted onto a single 60° x 40° constant-directivity-type horn. The loudspeaker system shall produce a horizontal beamwidth of

60° (+10°, -8°) and a vertical beamwidth of 40° (+15°, -5°) from 600-20,000 Hz. The loudspeaker system shall have a uniform on-axis frequency response from 150-20,000 Hz when used with the Electro-Voice MTX-4A electronic crossover/equalizer/time-delay unit with crossover frequencies at 1,600 and 10,000 Hz. The overall system shall have an efficiency of 25%.

The loudspeaker system shall have an enclosure constructed of .75-inch 14-ply birch plywood and shall have a black nylon cloth grille. The loudspeaker enclosure dimensions shall be 36.0 inches high, 36.0 inches wide and 29.9 inches deep and shall weigh 370 lb.

The loudspeaker system shall be the MTH-4A (MTH-4AC, MTH-4ACF, MTH-4AP and/or MTH-4APF).

WARRANTY (Limited)

Electro-Voice MT Speakers and Speaker Systems (excluding active electronics) are guaranteed for five years from date of purchase against malfunction due to defects in workmanship and materials. Electro-Voice MT flying hardware (rigging straps and enclosure-mounted hardware) is guaranteed for one year from date of original purchase against malfunction due to defects in workmanship and materials. Electro-Voice MT accessories (including dollies) are guaranteed for one year from date of original purchase against malfunction due to defects in workmanship and materials. If such malfunction occurs, unit will be repaired or replaced (at our option) without charge for materials or labor if delivered prepaid to the proper Electro-Voice service facility. Unit will be returned prepaid. Warranty does not extend to finish, appearance items, burned coils, or malfunction due to abuse or operation under other than specified conditions, nor does it extend to incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you. Repair by other than Electro-Voice or its authorized service agencies will void this guarantee. A list of authorized service centers is available from Electro-Voice, Inc., 600 Cecil St., Buchanan, MI 49107 (616-695-6831); and Electro-Voice West, 8234 Doe Ave., Visalia, CA 93291 (209-651-7777). Or Mark IV Audio Canada, Inc., 345 Herbert St., Genenouque, Ontario K7G2V1 Canada (613-382-2141); Mark IV Audio, A.G., Keltenstrasse 5, CH-2563 Ipsach, Switzerland (41-32-51-6833); Mark IV Vertnebs, GmbH, Larchenstrasse 99, 6230 Frankfurt/Main 80, West Germany (49-69-380-100); Mark IV Audio Japan, Ltd., 2-5-60 Izumi, Suginami-ku, Tokyo 168, Japan (81-3-325-7900); Electro-Voice, Pty., Unit 24/Block C, Slough Business Park, Slough Ave., Silverwater N.S.W. 2141 Australia (61-2-648-3455). This warranty gives you specific legal rights which may vary from state to state or province to province.

Service and repair address for this product: Electro-Voice, Inc., 600 Cecil St., Buchanan MI 49107.

Specifications subject to change without notice.



ELECTRO-VOICE, INC., 600 Cecil Street, Buchanan, Michigan 49107

MANUFACTURING PLANTS AT ■ BUCHANAN, MI ■ NEWPORT, IN ■ SEAFORD, DE ■ CHENNAI, INDIA